



Certificate of Analysis

Standard Reference Material[®] 1474a

Polyethylene Resin

This Standard Reference Material (SRM) is intended for use in calibration and performance evaluation of instruments used in polymer technology and science for the determination of the Melt Flow Rate using ASTM Method D1238-00. A unit of SRM 1474a consists of approximately 60 g of white polyethylene pellets in an amber glass bottle.

Certified Values and Uncertainties: This material is certified for Melt Flow Rate using ASTM Method D1238-00, Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer [1] Standard Test Condition 190/2.16. The flow rate of the melt was determined at $190.0\text{ }^{\circ}\text{C} \pm 0.1\text{ }^{\circ}\text{C}$ and a load of 2.16 kg by procedure A of the ASTM method. A manually operated extrusion plastometer was used. Under these conditions [2], the certified melt flow rate for this material is as follows:

$$\text{Melt Flow Rate (FR)} = 5.10\text{ g/10 min} \pm 0.42\text{ g/10 min}$$

The uncertainty is an expanded uncertainty $U = 2ku_c$ with U determined from a combined standard uncertainty, u_c and coverage factor $k = 2$ with a level of confidence of approximately 95 %. Type A and Type B contributions to the expanded uncertainty include the standard deviation of the melt flow measurements, instrument-to-instrument variation as discussed in ASTM D 1238-00, operator dependence of the measurement, and temperature gradients in the apparatus [2]. The standard deviation for single measurement is 0.056 g/10 min, with 44 degrees of freedom [2].

Expiration of Certification: The certification of SRM 1474a is valid until **01 January 2008**, within the measurement uncertainties specified, provided that the SRM is handled in accordance with the storage instructions given in this certificate. This certification is nullified if the SRM is modified or contaminated.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification before expiration of this certificate, NIST will notify the purchaser. Return of the attached registration card will facilitate notification.

Storage: The SRM should be stored in the original bottle with the lid tightly closed and under normal laboratory conditions.

Homogeneity: The homogeneity of SRM 1474a was tested by melt flow rate measurements using ASTM D1238-00. The characterization of this polymer is described in Reference 2.

The technical coordination leading to certification of this SRM was provided by B.M. Fanconi of the NIST Polymers Division.

The technical measurement and data interpretation were provided by K.M. Flynn, C.M. Guttman, J.R. Maurey, of the NIST Polymers Division.

Guidance in the statistical analysis was provided by S.D. Leigh of the NIST Statistical Engineering Division.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by J.W.L. Thomas and B.S. MacDonald.

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Certificate Issue Date: 18 March 2003

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REFERENCES

- [1] ASTM D 1238-00; *Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer*; ASTM Standards, Vol. 08.01, American Society for Testing and Materials, West Conshohocken, PA (2001).
- [2] Maurey, J.R.; Flynn, K.M.; Guttman, C.M.; *Certification of Standard Reference Material 1474a, A Polyethylene Resin*; NIST Special Publication Number SP 260-148.
- [3] *Guide to the Expression of Uncertainty in Measurement*; ISBN 92-67-10188-9, 1st Ed., ISO, Geneva, Switzerland, (1993); see also Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297, U.S. Government Printing Office; Washington, DC (1994); available at <http://physics.nist.gov/Pubs/>.

Users of this SRM should ensure that the certificate in their possession is current. This can be accomplished by contacting the SRM Program at: telephone (301) 975-6776; fax (301) 926-4751; e-mail srminfo@nist.gov; or via the Internet <http://www.nist.gov/srm>.